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seconded any more than a sensitive plate once used can receive a second photographic impression ; nor is it necessary with Mr. Skertchly to suppose that the pupa "notices" the color of its surroundings, though we do not know whether it is conscious of them or not. I have myself suggested³ that mimetic analogy is to be explained by the impression produced on the reproductive elements by a sense impression, as in the cases of "maternal impressions," of which some real cases exist. Nor does such a theory require that any "volition" be present, such as Mr. Poulton ascribed to "the founder" of American Neo-Lamarckianism. Such a hypothesis is confirmed by a fact mentioned by Mr. Poulton on page 238. He says: "This example enforces a conclusion arrived at by the study of mimetic butterflies in all parts of the world,—that the females are far more liable to assume this method of defense than the males. Thus Mr. Wallace found that the eastern *Morphidæ* and the special group of swallow-tails were only mimicked by the females of other swallow-tails ; and similar facts have been observed in America." The male young have developed beyond the effects of the impression, while the female young have not.—E. D. COPE.

Billet on the Life History of Bacteria.⁴—In addition to elaborate laboratory work with the *Cladothrix dichotoma*, *Bacterium balbianii*, *Bacterium osteophilum*, and *Bacterium parasiticum*, following them step by step through the filamentous, dissociated, entangled, and zoogloëic states, and giving conclusive proof that the present classification of microbes is erroneous, this work has a bibliographic index of 662 references, including the names of over four hundred authors.

The author does much to clear up the history of this subject, and also points out clearly that more attention has been paid to the effects upon the animal economy than to the morphology. He calls attention to the fact that the "Cohn school" declares for one unchangeable form, and that Zopf merely specifies types according to the forms.

Billet very properly claims that one form may be derived from another, and cites that Ray Lankester first recorded that the forms were not sufficient for classification, the latter being confirmed by Cienkowski. Billet shows that the bacterium (the short rod form) is able to take on sufficient length to represent the bacillus ; that a number of these can form chains ; and that the vibrio is found in different media to change into the spirillum. He follows the cladothrix through

³ Proceedings American Philosophical Society, 1871, p. 261. Origin of the Fittest, p. 213.

⁴ Contribution a l'étude de la Morphologie et du Développement des Bacteriacées, par Albert Billet, Docteur en Médecine, Médecin-Major, 2 Classe.—*Bulletin Scientifique de la France et de la Belgique*, 1890.

all the known forms of microbes, and shows that these microorganisms have different powers of receiving stains according to their ages.

If he be correct in the foregoing statements, many genera will be done away with. It is very interesting to follow his experiments showing the growth and development of one form into another, noting his methods of detecting the cells, etc., which methods show much labor and careful manipulation.

In treating of the typhoid germ he claims that it is not chromogenic. The work shows a marked difference in the various forms of the *Bacterium balbianii* (found in marine algæ), and the *Micrococcus prodigiosus* and the *Bacillus violaceus*, and follows them through the filamentous, dissociated, entangled, and zooglœic forms; it shows that they can live in air and may resist 100° C., that they assume an orange color on the surface of certain solid media, and that they undergo endogenous spore formation. It also shows that the *Bacterium osteophilum* is mostly found in macerated human bone surrounded with yellow fat, and that this also undergoes endogenous spore formation. He shows an evolution cycle, divided into the filamentous, dissociated, entangled, and zooglœic states. These different states correspond to a morphological grouping, and are due to the nutritive media, temperature, pressure, amount of oxygen, etc. Consequently, many morphological forms represent the same species. The zooglœic state merely represents a state of preservation. As has been said, the forms cannot determine the genera; and as we do not know at present the principal genera, we must not attempt to classify them.

It will be seen that Billet is working in the right direction to reduce bacteriology to an exact science.—S. G. DIXON.

Corals and Coral Islands. BY JAMES D. DANA.—About a half-century ago two exploring expeditions were almost simultaneously circumnavigating the globe; one under the command of Captain (afterwards Admiral) Fitzroy of the English Navy, the other under the command of Lieutenant (afterwards Admiral) Wilkes of the United States Navy. These two expeditions are chiefly memorable for the work of two brilliant young naturalists by whom respectively they were accompanied. In the English expedition went a recent graduate of Cambridge, Charles Darwin, whose dust now rests in Westminster Abbey near to that of Sir Isaac Newton, and whose discovery of natural selection—the law of gravitation of organic nature—makes his name an epoch-making one in science since that of Newton. In the American expedition went a recent graduate of Yale, who still lives, full of years and honors, his eye not dim and his natural force not abated, facile princeps of American geologists, James D. Dana. Among